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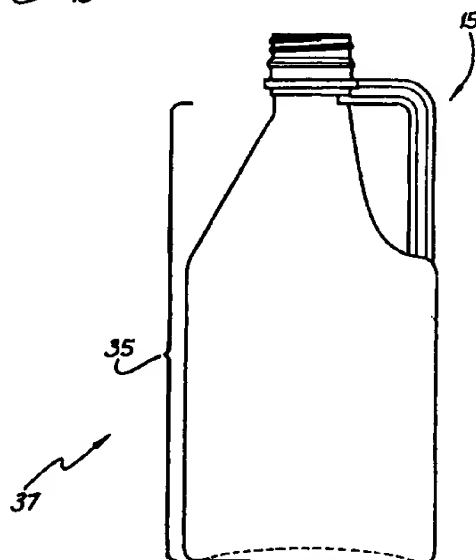
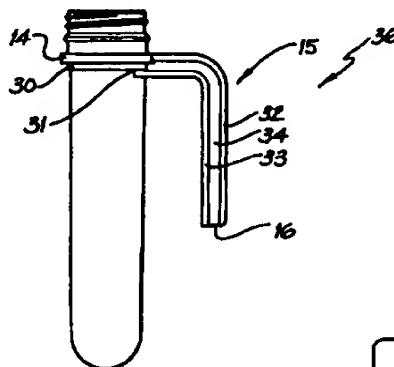
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(54) Title: CONTAINER WITH INTEGRAL HANDLE, PREFORM AND METHOD OF MANUFACTURE

(57) Abstract

A preform for a container comprised of orientable thermoplastic material and arranged so that the resultant blown container will include a handle or like support structure; the preform comprising a moulded structure having a neck portion and an expandable portion below the neck, the neck including a locating ring above the expandable portion and a solid stem of orientable thermoplastics material projecting from the locating ring and moulded integrally therewith which when the container is formed constitutes the handle. In a preferred embodiment, there are two non-expanding regions immediately below the locating ring, the first of which is raised or otherwise differentiated. A ribbed handle is attached to the locating ring and the non-expanding region.



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CONTAINER WITH INTEGRAL HANDLE, PREFORM
AND METHOD OF MANUFACTURE

INTRODUCTION

This invention relates to a preform from which a
5 container such as a PET container can be blown and more
particularly to a preform and a container formed therefrom
that has an integral handle.

BACKGROUND OF THE INVENTION

Attempts have been made to incorporate integral
10 handles in PET and like injection blow moulded containers -
for example see US 4,629,598 to Thompson, assigned to Tri-
Tech Systems International, Inc. The parison from which
the handled bottles of US 4,629,598 are produced is
illustrated in Fig. 1. To date, however, attempts to
15 produce a practical, mass produced version of this
arrangement have been unsuccessful. Instead, the best that
appears to have been done in commercial practice is an
arrangement whereby the blown containers are arranged to
accept a clip on or snap on handle in a separate production
20 step after the container itself is formed. See for example
WO82/02371 and WO82/02370, both to Thompson.

Injection-stretch-blow moulding is a process in which
the parison is stretched both axially and radially,
resulting in biaxial orientation.

25 Biaxial orientation provides increased tensile
strength (top load), less permeation due to tighter

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alignment of the molecules, and improved drop impact, clarity, and lightweighting of the container.

Not all thermoplastics can be oriented. The major thermoplastics used are polyethylene terephthalate (PET),
5 polyacrylonitrile (PAN), polyvinyl chloride (PVC), and polypropylene (PP). PET is by far the largest volume material, followed by PVC, PP, and PAN.

The amorphous materials, e.g., PET, with a wide range of thermoplasticity are easier to stretch-blow than the
10 partially crystalline types such as PP. Approximate melt and stretch temperatures to yield maximum container properties are:

	Material	Melt, Degrees C.	Stretch, Degrees C.
15	PET	280	107
	PVC	180	120
	PAN	210	120
	PP	240	160

There are basically two types of processes for
20 stretch-blow moulding: 1) single-stage in which preforms are made and bottles blown on the same machine, and 2) two-stage in which preforms are made on one machine and blown later on another machine.

Single-stage equipment is capable of processing PVC,
25 PET, and PP. Once the parison is formed (either extruded or injection moulded), it passes through conditioning stations which bring it to the proper orientation temperature. The single-stage system allows the process to proceed from raw material to finished product in one
30 machine, but since tooling cannot be easily changed, the process is best suited for dedicated applications and low volumes.

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Oriented PVC containers most commonly are made on single-stage, extrusion-type machines. The parison is extruded on either single- or double-head units.

5 Temperature conditioning, stretching, and thread forming are done in a variety of ways depending on the design of the machine. Many of the processes presently in use are proprietary.

10 Many oriented PET containers are produced on single-stage machines. Preforms are first injection moulded, then transferred to a temperature conditioning station, then to the blow moulding operation where the preforms are stretch-blown into bottles, and finally to an eject station.

15 With the two-stage process, processing parameters for both preform manufacturing and bottle blowing can be optimized. A processor does not have to make compromises for preform design and weight, production rates, and bottle quality as he does on single-stage equipment. He can either make or buy preforms. And if he chooses to make them, he can do so in one or more locations suitable to his market. Both high-output machines and low output machines are available. Two stage extrusion-type machines generally are used to make oriented PP bottles. In a typical process, preforms are re-extruded, cooled, cut to length, reheated, stretched while the neck finish is being trimmed, and ejected. The two-stage process is the lowest-cost method to produce oriented PET containers. The two-stage process, which permits injection moulding of the preform and then shipping to blow moulding locations, has allowed companies to become preform producers and to sell to blow moulding producers. Thus companies that wish to enter the market with oriented PET containers can minimise their capital requirements. Two-stage stretch-blow moulding also is being used for production of oriented PVC containers. Preform design and its relationship to the final container remains the most critical factor. The proper stretch ratios in the axial and hoop directions must be met if the container is to properly package its intended product.

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25
30
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	Material	Stretch Ratios	Orientation Temp.Deg.F
	PET	16/1	195-240
	PVC	7/1	210-240
5	PAN	9/1	220-260
	PP	6/1	260-280

It is an object of the present invention to produce a practical, readily implementable injection, stretch blow moulded container made from an orientable thermoplastics material incorporating a handle which is formed during and as part of the said injection, stretch blow moulding operation.

SUMMARY OF THE INVENTION

According to one aspect of the invention, there is provided a preform for a container comprised of orientable thermoplastic material and arranged so that the resultant blown container will include a handle or like support structure; said preform comprising a moulded structure having a neck portion and an expandable portion below the neck, said neck including a locating ring above the expandable portion and a solid stem of orientable thermoplastics material projecting from the locating ring and moulded integrally therewith which when the container is formed constitutes the handle.

Preferably said stem projects from said locating ring and from a temperature transition zone located immediately below said ring.

According to another aspect of the invention there is provided a method of forming a container having an integral handle; said method comprising:

(a) forming a preform having a neck portion and an expandable portion below the neck portion, said neck portion including a locating ring above the expandable portion and a solid stem of orientable thermoplastics material projecting from the locating ring and moulded integrally therewith, and

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(b) performing a blow moulding operation on said preform to expand the expandable portion to form the body of the container.

5 Preferably said stem projects from said locating ring and from a temperature transition zone located immediately below said ring.

In a preferred form of the invention, the neck portion and integral handle are subjected to a crystallisation step.

10 Preferably, the blow moulding operation includes supporting the stem whilst the preform is blown in a manner whereby at least a portion of the external side of the tube expands to encircle at least a lower portion of the stem so as to form an enclosed grip portion between the external
15 side and the solid stem.

It is preferred that the enclosed grip portion allows at least two fingers of the adult human hand to pass therethrough.

20 In a particularly preferred form of the invention the stem is formed so as to have an I-shaped cross-section at least throughout that portion of the stem where it projects from the external side of said tube. The handle may be curved to provide additional strength.

25 In a further broad form of the invention there is provided a parison for an injection stretch blow moulding process, said parison formed by an injection process including two separate points of injection.

30 Preferably a first point of injection permits injection of non-recycled PET or like thermoplastics material. Preferably a second point of injection permits injection of PET or like thermoplastics material incorporating at least a portion of recycled material.

35 Preferably said first point of injection is for the formation of that part of the parison which will be stretched during a stretch blow moulding operation on the parison. Preferably said second point of injection is for the formation of those parts of said parison which will

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remain unexpanded or substantially unexpanded in a stretch blow moulding operation on said parison.

In yet a further broad form of the invention there is provided a container manufactured from a two stage
5 injection stretch blow moulding process, said container including a graspable handle affixed at at least a first point and a second point to said container so as to form an enclosed area between the handle and the bottle and through which the fingers of a human hand may be passed.

10 Preferably said first point of connection comprises an integral connection between the handle and the container and is formed in said first step of said two step operation.

15 Preferably said second point of connection is formed during said second step of said two step operation.

Preferably said handle at said second point of interconnection includes a bulbous portion adapted to be at least partially enfolded by a portion of said container as it is blown during said second step of said two step
20 operation whereby a mechanically interlocked connection is formed at said second point of connection of said handle to said container.

In particular preferred forms said bulbous portion comprises one of an upwardly extending hook, a downwardly
25 extending hook, a bulb or a combination of one or more thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention will now be described by way of example, with reference to the
30 accompanying drawings, in which:
Fig. 1 is a side view of a prior art parison,
Fig. 2 is a side view of a parison incorporating features according to embodiments of the present invention,
Fig. 3 is a partial side elevational view of a blow moulded
35 PET container formed from a preform according to one embodiment of the invention;

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Fig. 4 illustrates the steps of formation of a parison according to another embodiment of the invention.

Fig. 5A is a side view of a preform according to a further embodiment of the invention;

5 Fig. 5B is a side view of a container formed from the preform of Fig. 5A.

Fig. 6 is a side view of a die in open position for manufacture of a preform;

Fig. 7 is the die of Fig. 6 in closed position and

10 Fig. 8 is a side view of the die of Figs. 6 and 7 showing the stem of the preform located therein.

DETAILED DESCRIPTION OF THE DRAWINGS

A container 10 according to an embodiment of the invention is shown in Fig. 3. It includes a neck 11 and an
15 expanded portion 12.

The neck 11 has a threaded portion 13 and a locating ring 14. Moulded integrally with the ring 14 is a stem 15 having a first portion 15a extending outwardly from the ring 14 and a second portion 15b so inclined to the first
20 portion 15a that it is nearly parallel to a vertical axis of the container 10. In this instance, the first portion 15a subtends an angle of slightly more than 45° to the wall 20 and the second portion subtends an angle of about 20° to the wall 20.

25 The particular shape of the stem 15 is selected so that when formed as a handle it may be grasped by fingers of the human hand.

The stem 15 terminates in a stem end 16 which faces generally downwardly in the general direction of closed end
30 of the container 10.

In this instance, the stem 15 is of I-shaped cross-section to combat unwanted effects arising at or near junction 17 of stem 15 with the ring 14 following a blowing operation on the preform 10.

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These unwanted effects particularly include stress effects and air inclusions resulting from non-uniform cooling through preform volumes of differing cross-section.

5 In this embodiment of the invention, the preform is made from PET and is prepared utilizing a heated mould.

10 In order to produce the container 10, the parison or preform 26 (see Fig. 2) according to an embodiment of the invention can be placed in a blow moulding machine (not shown) and blow moulded according to bi-axial orientation blow moulding techniques with the neck 11 being held in a mould in such a way as not to expand. Initially, the expandable portion of the preform below the neck can be mechanically stretched downwardly to the bottom of the

15 outwardly by application of compressed air to the extent that a support portion 18 is formed around the stem end 16 such that an enclosed area 19 is formed between wall 20 of the container 10 and the stem 15 in the process of the formation by blow moulding of container 10.

20 In a particular preferred form of the invention, the enclosed area 19 is of sufficient cross-sectional area to allow at least two fingers of a human hand to be inserted therethrough and to grasp handle 15 so as to support the container 10.

25 The blow moulding operation is carried out in such a way so as to provide a bottle or container having optimum strength by achieving biaxial orientation of the molecules of the preferred PET material as well as improved barrier properties to reduce oxidation.

30 In accordance with an embodiment of the invention, the neck 11 and handle 15 can be crystallised by over-heating those parts of the preform. The crystallisation of the handle increases its rigidity which assists orientation of the preform and permits the use of less material.

35 Crystallisation of the neck and handle can be carried out by running hot oil over the neck and handle, applying an open flame or by blowing hot air.

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The location of the handle 15 on the ring 14 ensures that there is minimum interference to the blow moulding process applied to the remainder of the preform. Either a one stage or two stage process can be used.

5 Detailed Description of Further Embodiments

Fig. 1 illustrates the prior art preform or parison 21 of US 4,629,598. The concept of this prior art disclosure is to form a handle portion 23 from the locating ring of non-expandable portion 22 of the parison 21.

10 With reference to Fig. 2 and with reference to the detailed description of the preferred embodiment this arrangement of Fig. 1 is modified according to the present invention in a number of respects.

15 Insets 2A, 2B and 2C show bulbous portions 27 forming part of stem end 16 in the shape, respectively of a downwardly extending hook 24a, a bulb 24b and an upwardly extending hook 24c.

20 These portions have in common a shape which is adapted to engage mechanically with a blown portion of the container 10 which is adapted to envelop the bulbous portion 27.

25 The process by which the second stage blow of the expandable portion 12 of parison 26 is effected so as to envelope the bulbous portion 27 of stem end 16 is a stretch blow, biaxial orientation process.

30 With reference to Fig. 4 a particular method of manufacture of the parison 26 according to another embodiment of the invention is illustrated. It includes a two stage process for the formation of the parison by an injection moulding process. In Stage 1 a first injection mould inlet 28 permits entry of plastics material for the formation of the expanded portion 12 of the parison 26 (expanded in the blow moulding stage of container formation, with reference to Fig. 3).

35 In a second stage of the injection moulding process for the formation of parison 26 a second injection mould

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inlet 29 permits entry of plastics material for the formation of the non-expandable portion 25 of parison 26.

5 The two stage injection arrangement is such that different plastics materials may be injected through first injection mould inlet 28 and second injection mould inlet 29.

10 In a particular preferred form the plastics material injected in first injection mould inlet 28 is non-recycled or substantially non-recycled plastics material whilst the plastics material injected into second injection mould inlet 29 is recycled or at least partially recycled plastics material.

15 This arrangement permits controlled use of proportions of recycled and non-recycled plastics material in order to achieve optimum economics in the construction of parison 26.

20 In a modification of this arrangement the Stage 2 step can include the production of two walls in the non-expandable portion 25 comprising inner wall 51 and outer wall 52. Inner wall 51 is made from virgin or non-contaminated PET material and acts as an insulation barrier with respect to wall 52 which can be made from recycled material 52. This dual wall arrangement can be produced by use of a sliding core arrangement as a modification in the die arrangement and process described with reference to 25 Figs. 6, 7 and 8 later in this specification.

Of course the Stage 1 and Stage 2 steps of Fig. 4 can be interchanged in order.

30 A parison and resulting container according to a further embodiment of the invention are illustrated in Figs. 5A and B respectively. Like parts are numbered as for previous embodiments.

35 In this embodiment the parison 21 includes a locating ring 14 immediately below which is a first non-expanding region 30 and a second non-expanding region 31. The first non-expanding region 30 may itself be formed so as to be slightly raised or otherwise differentiated from the

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expandable portion of parison 21. Second non-expanding region 31 may not be differentiated from the expandable portion of parison 21 but, in use, the blowing operation will be such as to ensure that the second non-expanding region 31 is not expanded in the blowing process.

In this case the stem 15 includes a first rib 32 integrally moulded with and extending from locating ring 14. The stem 15 also includes second rib 33 integrally moulded with and extending from second non-expanding region 31. Stem 15 further includes a rib connector 34 integrally moulded with and extending from first non-expanding region 30 and forming a continuous connection between first rib 32 and second rib 33 throughout the length of stem 15.

The parison 36 of Fig. 5A is then blown in the manner previously described to form the volume 35 of container 37 illustrated in Fig. 5B. The neck portion including stem 15, ring 14, first non-expanding region 30 and second non-expanding region 31 remain unexpanded whilst the expandable portion 36 of parison 36 is biaxially stretched to form the major volume 35 of container 37. The stem end 16 may include the bulbous portions according to the previously described embodiments for connection to container 37 or, either alternatively or in addition can include the application of an adhesive material whereby a chemical bond is formed between stem end 16 and the wall of container 37 by the use of a chemical intermediary.

In a modification of the embodiments of Fig. 5A and Fig. 5B first non-expanding region 30 and second non-expanding region 31 can form part of a single non-expanding region.

In yet a further modification second non-expanding region 31 can be located in the temperature transition zone of the container and wherein minor expansion during the blow moulding step may take place.

In yet a further modification both first non-expanding region 30 and second non-expanding region 31 may be located in the temperature transition zone immediately below the

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locating ring 14 and, again, minor expansion of these regions may take place during blowing.

With respect to the last two variations described advantage is taken of the observation that expansion at the temperature transition zone can be limited by appropriate mould design and process control whereby unwanted distortion effects caused by the rigid interconnection of this temperature transition zone 30, 31 via second rib 33 and rib connector 34 to ring 14 (or other non-expanding portion of the neck 11) can be controlled.

In use preforms and containers blown therefrom can be manufactured as follows:

A preform is formed from orientable thermoplastics material, preferably PET or like material in an injection moulding process. Slidable dies are illustrated in Figs. 6, 7 and 8 and include a sliding core 40, sliding blocks 41, body 42, base 43, push block 44 and splits holder 45. Fig. 6 illustrates the die in open position, Fig. 7 illustrates the die in closed position and Fig. 8 illustrates a side view showing accommodation of the stem 14.

The completed preforms in a second and preferably separate step are subsequently passed to a stretch blow mould machine where the preforms are first reheated to the appropriate transition temperature (refer introduction). The non-expandable portion of the preform including locating ring 14 and stem 15 are shielded substantially from the reheat process by appropriate guarding. In most instances there is likely to be a temperature transition zone in the region 30, 31 described with reference to Figs. 5A, 5B.

The reheated preform is then placed in a mould and biaxially stretched and the expandable portion blown to full size utilising processes known in the art. During this process the preform is supported at neck 14 and may also be supported at stem 15. Stem 15 does not take part in the blow process although its stem end 16 may be

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partially enveloped by an external wall of the blown container.

5 The above describes only some embodiments of the present invention and modifications obvious to those skilled in the art can be made thereto without departing from the scope and spirit of the present invention.

INDUSTRIAL APPLICABILITY

10 Embodiments of the invention are applicable to the manufacture of containers made from orientable thermoplastics material and incorporating a handle or like grasping fixture as an integral component of the container.

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CLAIMS

1. A preform for a container comprised of orientable thermoplastic material and arranged so that the resultant blown container will include a handle or like support structure; said preform comprising a moulded structure having a neck portion and an expandable portion below the neck, said neck including a locating ring above the expandable portion and a solid stem of orientable thermoplastics material projecting from the locating ring and moulded integrally therewith which when the container is formed constitutes the handle.
2. A method of forming a container having an integral handle; said method comprising:
 - (a) forming a preform having a neck portion and an expandable portion below the neck portion, said neck portion including a locating ring above the expandable portion and a solid stem of orientable thermoplastics material projecting from the locating ring and moulded integrally therewith, and
 - (b) performing a blow moulding operation on said preform to expand the expandable portion to form the body of the container.
3. The method of claim 2 wherein the neck portion and integral handle are subjected to a crystallisation step.
4. The method of claim 2 wherein the blow moulding operation includes supporting the stem whilst the preform is blown in a manner whereby at least a portion of the external side of the tube expands to encircle at least a lower portion of the stem so as to form an enclosed grip portion between the external side and the solid stem.
5. The method of claim 4 wherein the enclosed grip portion allows at least two fingers of the adult human hand to pass therethrough.

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6. The method of claim 2 wherein the stem is formed so as to have an I-shaped cross-section at least throughout that portion of the stem where it projects from the external side of said tube.
7. A parison for an injection stretch blow moulding process, said parison formed by an injection process including two separate points of injection.
8. The parison of claim 7 wherein a first point of injection permits injection of non-recycled PET or like thermoplastics material.
9. The parison of claim 7 or 8 wherein a second point of injection permits injection of PET or like thermoplastics material incorporating at least a portion of recycled material.
10. The parison of claim 7 or 8 wherein said first point of injection is for the formation of that part of the parison which will be stretched during a stretch blow moulding operation on the parison.
11. The parison of claim 9 wherein said second point of injection is for the formation of those parts of said parison which will remain unexpanded or substantially unexpanded in a stretch blow moulding operation on said parison.
12. A container manufactured from a two stage injection stretch blow moulding process, said container including a graspable handle affixed at at least a first point and a second point to said container so as to form an enclosed area between the handle and the bottle and through which the fingers of a human hand may be passed.
13. The container of claim 12 wherein said first point of connection comprises an integral connection between the handle and the container and is formed in said first step of said two step operation.
14. The container of claim 13 wherein said second point of connection is formed during said second step of said two step operation.

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15. The container of claim 14 wherein said handle at said second point of interconnection includes a bulbous portion adapted to be at least partially enfolded by a portion of said container as it is blown during said second step of said two step operation whereby a mechanically interlocked connection is formed at said second point of connection of said handle to said container.
16. The container of claim 15 wherein said bulbous portion comprises one of an upwardly extending hook, a downwardly extending hook, a bulb or a combination of one or more thereof.
17. The container of any one of claims 12 to 16 wherein an adhesive is utilised to assist connection at said second point of interconnection.
18. The preform of Claim 1 further including a locating ring immediately below which is a first non-expanding region and a second non-expanding region.
19. The preform of Claim 18 wherein the first non-expanding region is formed so as to be slightly raised or otherwise differentiated from the expandable portion of parison.
20. The preform of Claim 18 or 19 wherein the second non-expanding region is not differentiated from the expandable portion of parison.
21. The preform of any one of Claims 18-20 wherein the stem includes a first rib integrally moulded with and extending from locating ring.
22. The preform of Claim 21 which also includes a second rib integrally moulded with and extending from said second non-expanding region.
23. The preform of Claim 22 which further includes a rib connector integrally moulded with and extending from first non-expanding region and forming a continuous connection between said first rib and said second rib throughout the length of said stem.

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24. The preform of any one of Claims 18-23 and wherein said second non-expanding region forms part of a temperature transition zone.
25. The preform of any one of Claims 18-24 and wherein said first non-expanding region forms part of said temperature transition zone.
26. The preform of Claim 24 or Claim 25 wherein deformation of said temperature transition zone takes place during a stretch blow moulding process.
27. The preform of any one of Claims 18-26 manufactured by a two stage injection moulding process wherein material is injected at different locations in the die to form a preform adapted to be composed from more than one type of material.
28. The preform of Claim 27 wherein during at least one stage of said two stage process an inner wall and outer wall of said preform is formed, said inner wall adapted to be made from a different material from said outer wall.
29. A container stretch blow moulded from the preform of any one of claims 18-28.
30. A container made from PET material and stretch blow moulded from the preform of any one of Claims 18-29.

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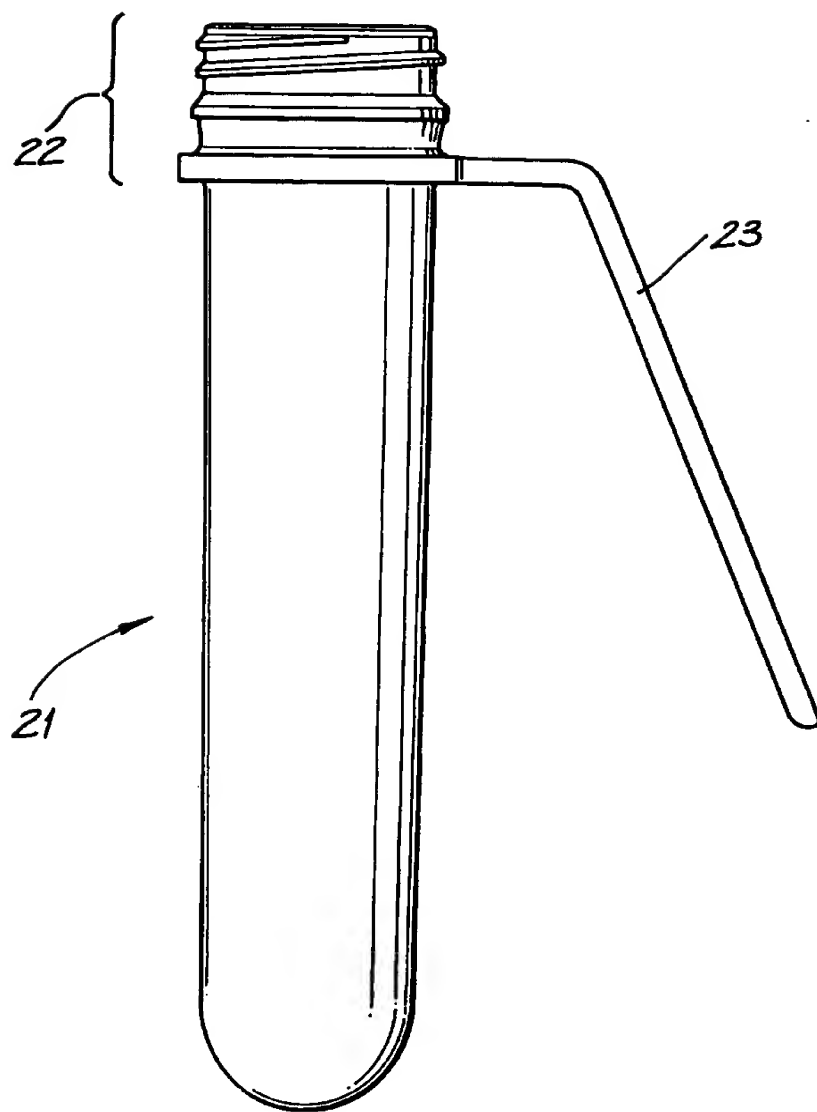


FIG. 1
PRIOR ART

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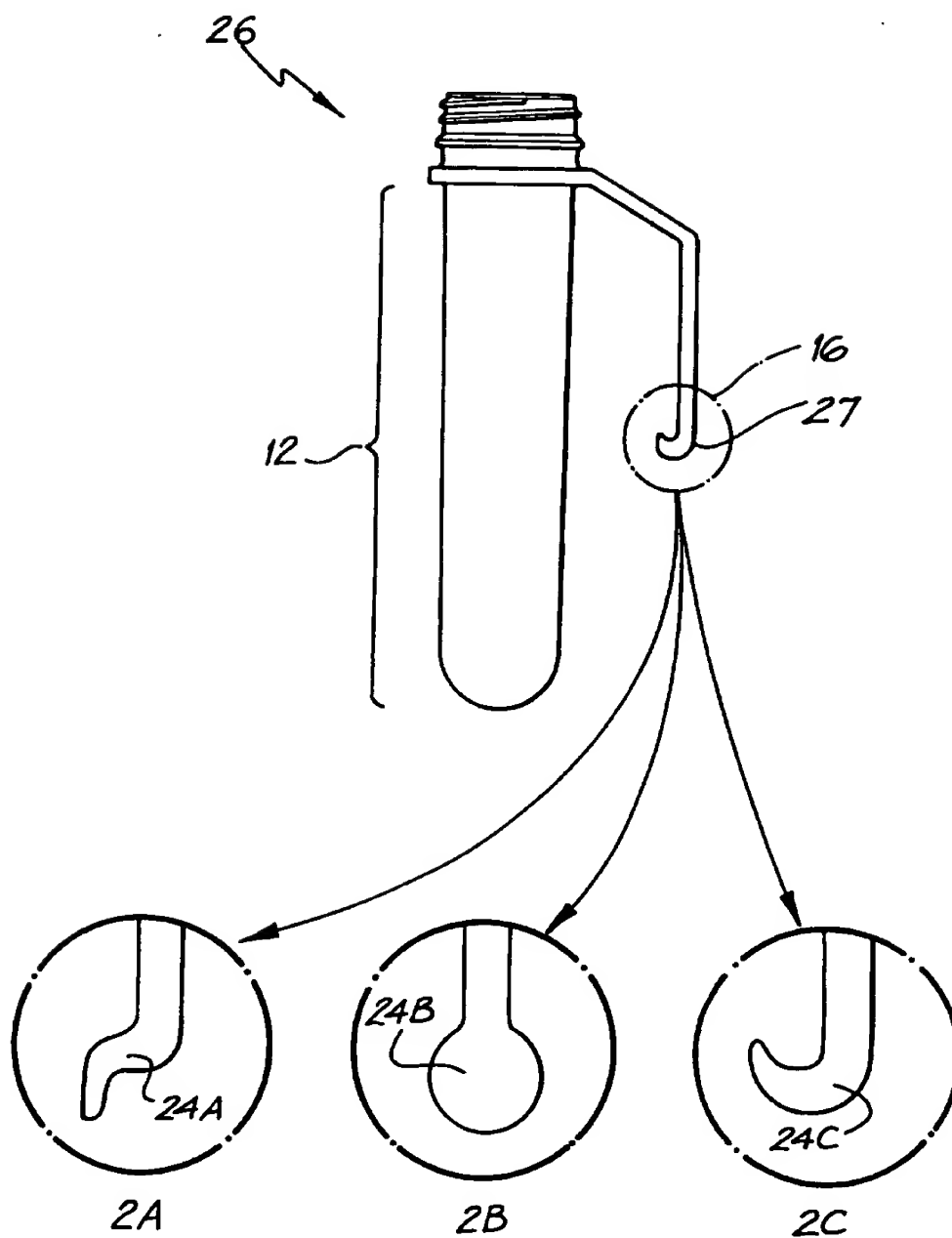


FIG. 2

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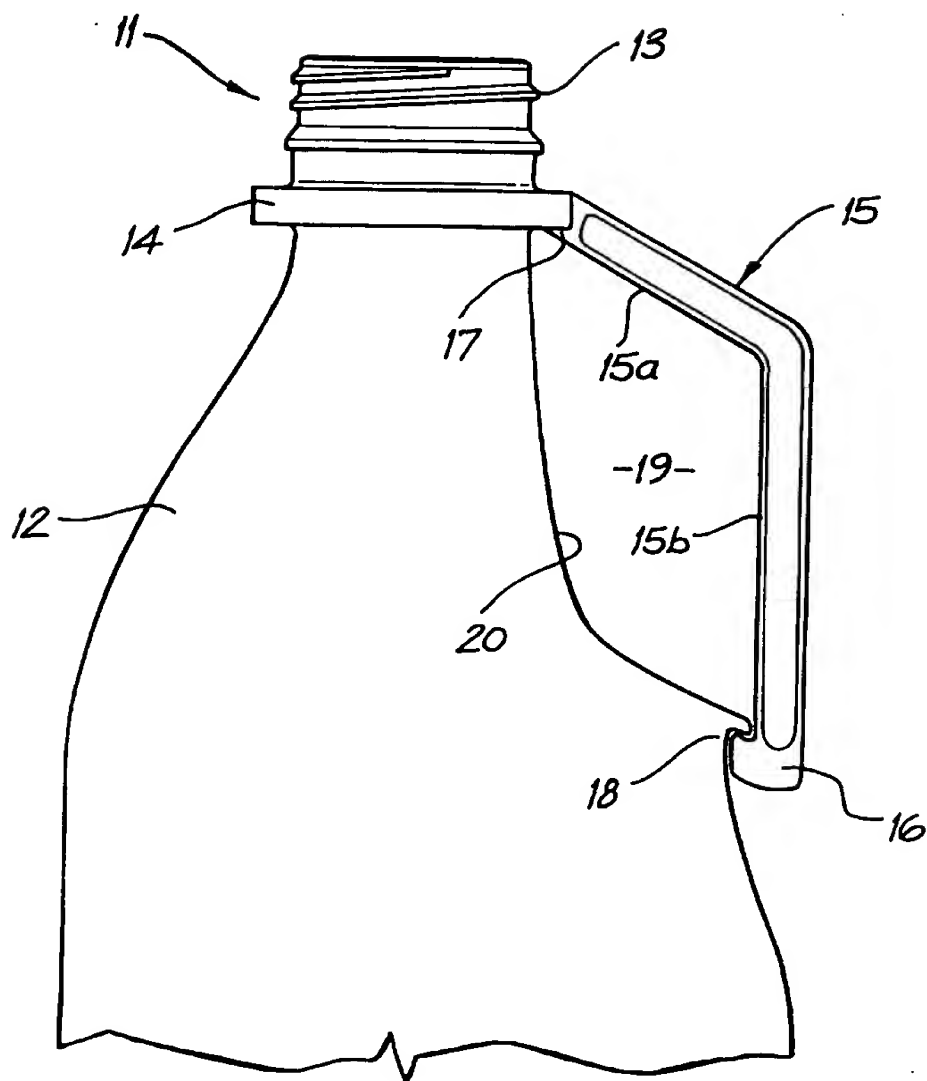


FIG. 3

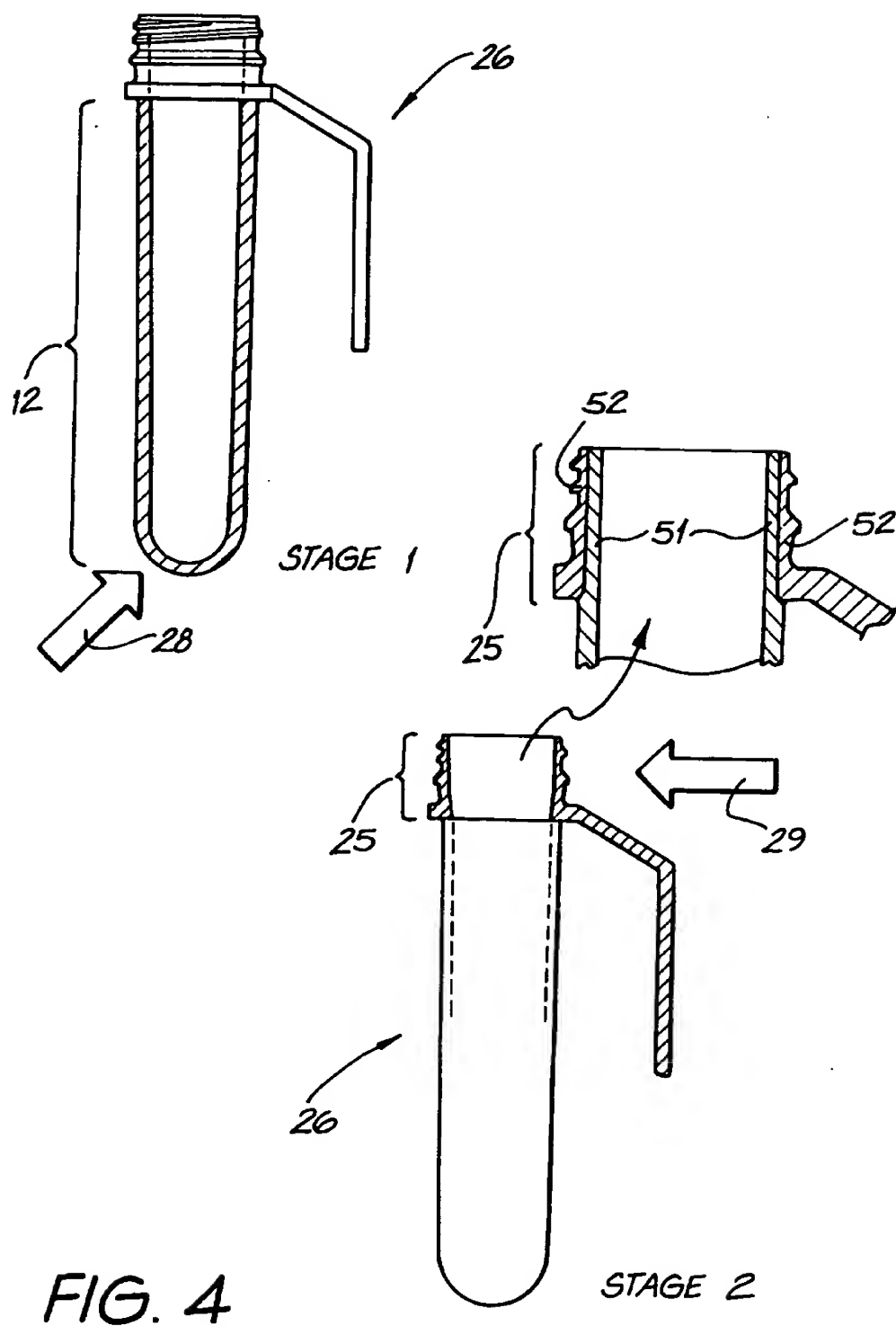


FIG. 4

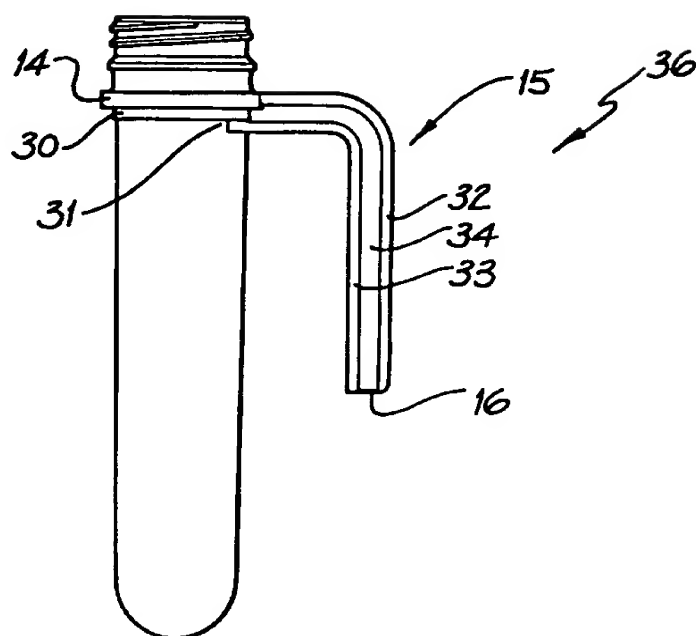


FIG. 5A

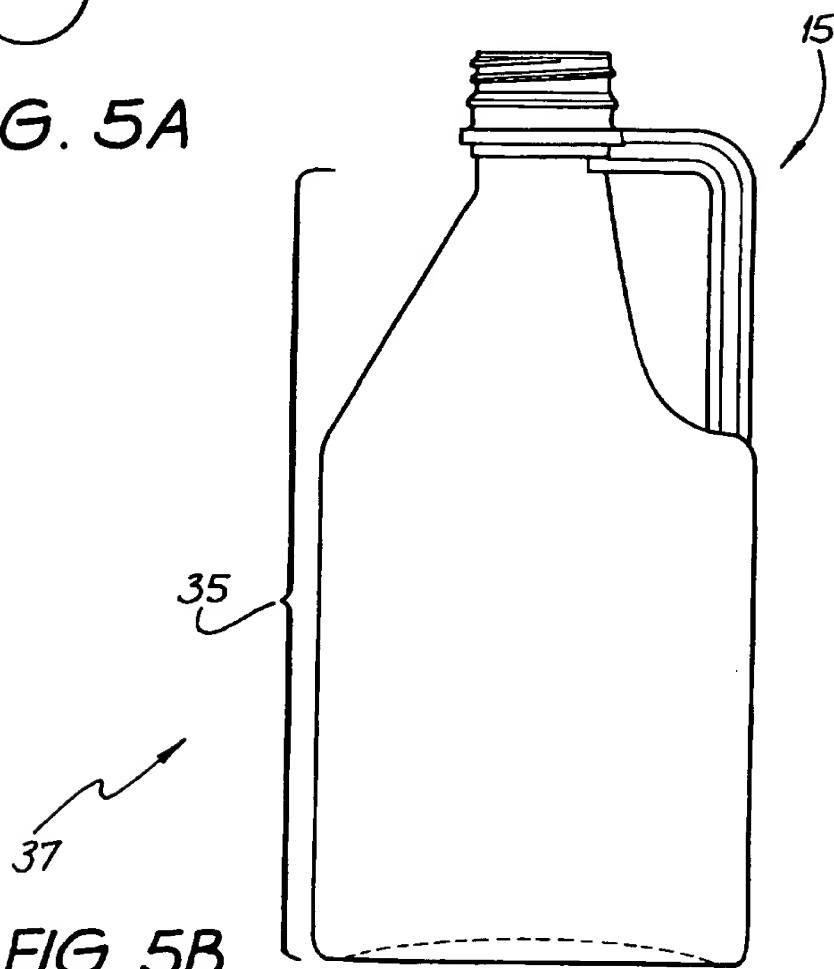


FIG. 5B

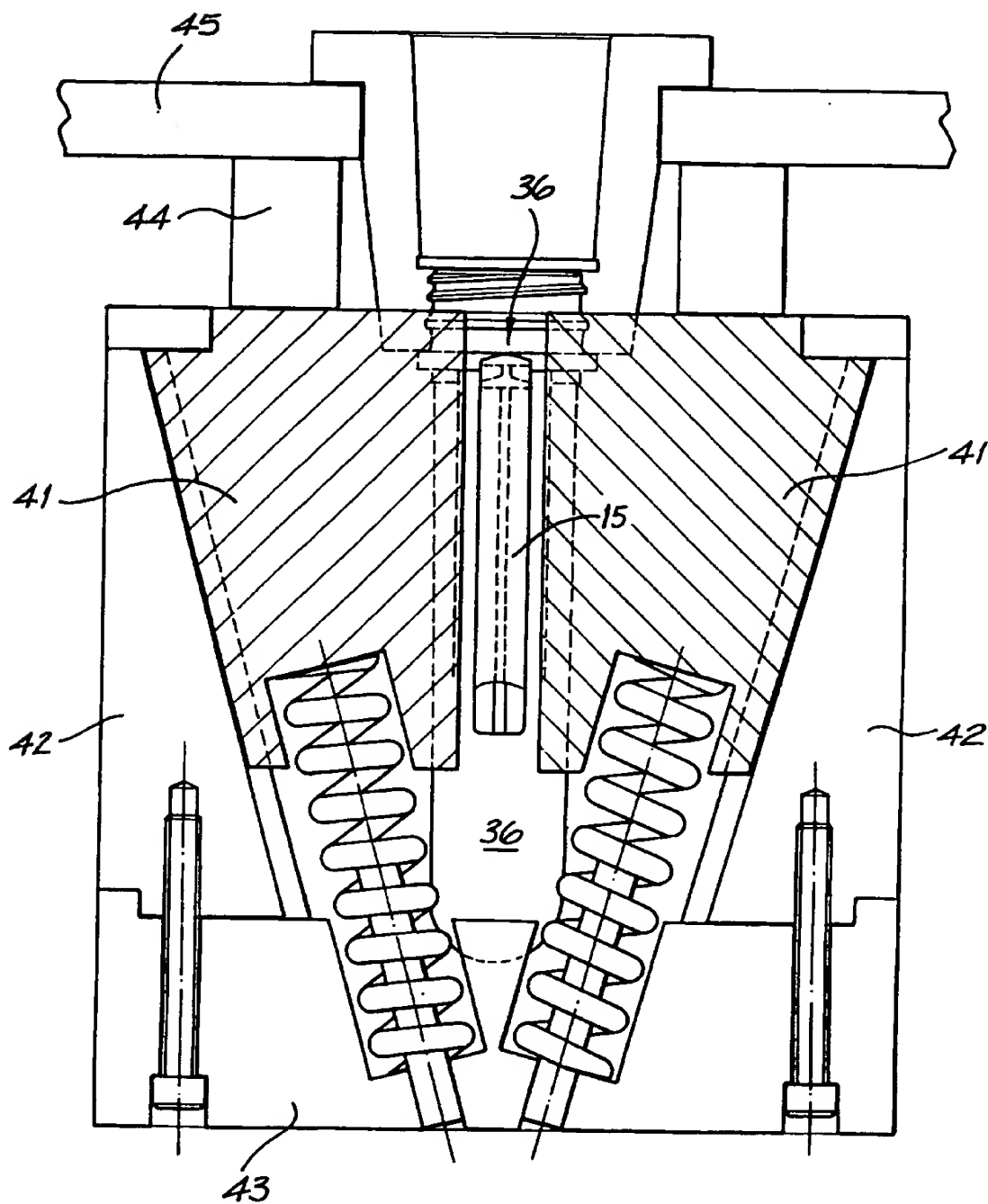


FIG. 6

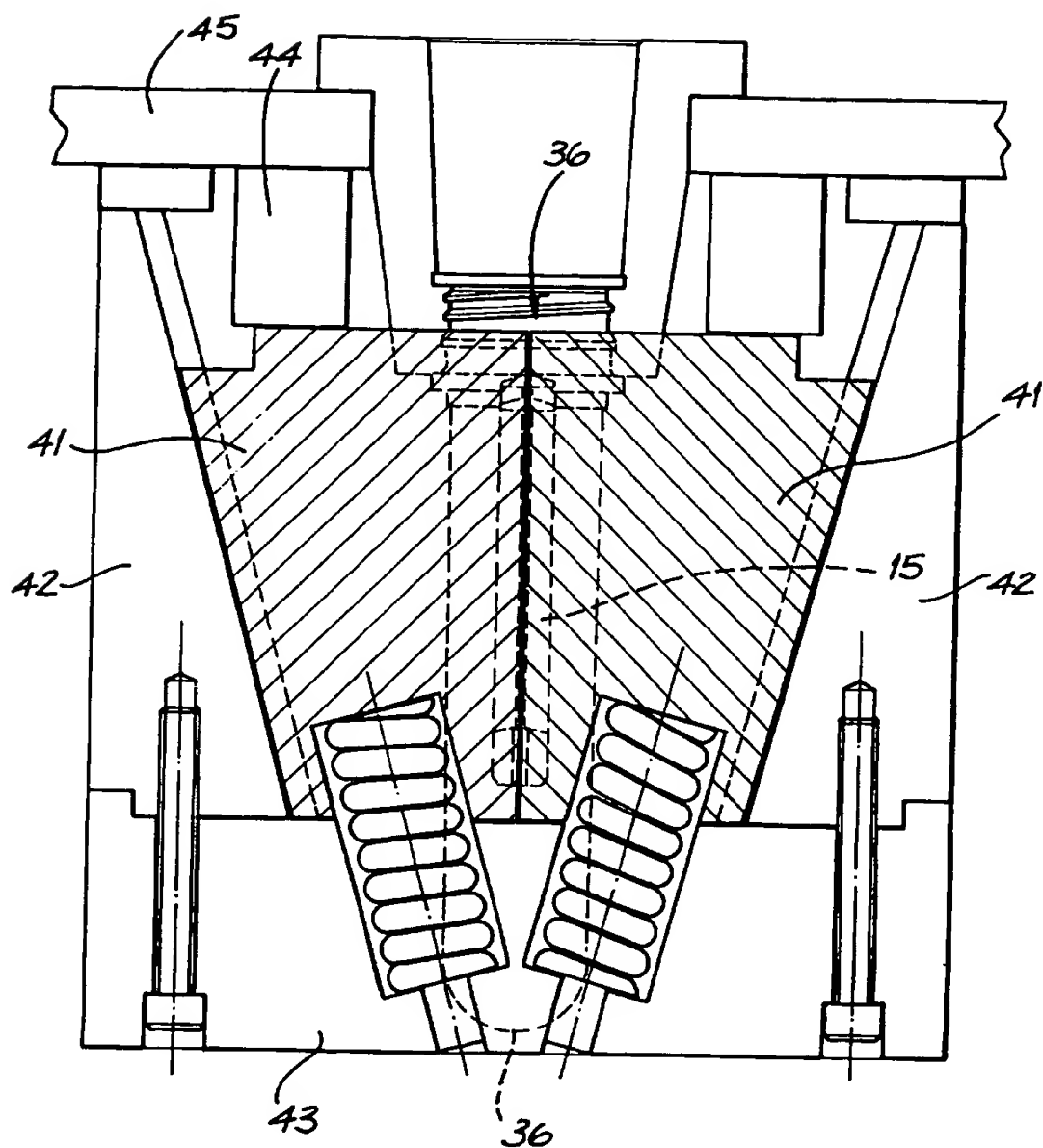


FIG. 7

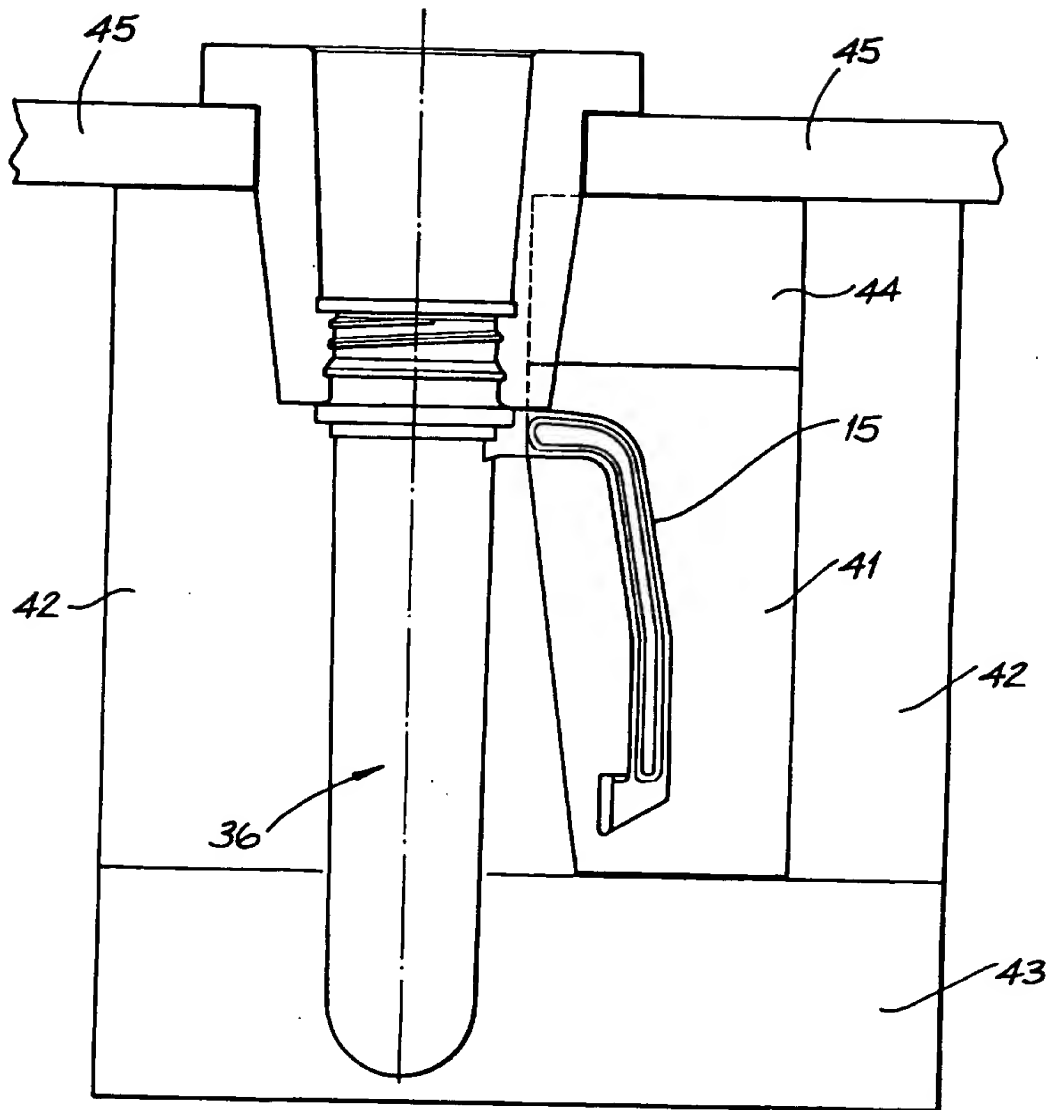


FIG. 8

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 96/00232

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl⁶: B29C 49/06, 49/20 B29B 11/08 B29L 22:00 B65D 23/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC : B29C 49/06, 49/20, 49/76 B29D 23/03

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
IPC : AU as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Derwent: (B29C 49/06 or B29C 49/20 or B29C 49/76 or B29D 23/03) and (handle or stem or grip or support)
JAPIO: as above

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	FR 2541622 A1 (CAPY) 31 August 1984 see Abstract, claims, page 1 lines 24-38, page 2 lines 25-32, page 6 lines 5-12 and 16-22, figs 1-4 and 10-12	1, 18-23, 27, 29 30 24-26, 28
X Y	US 4629598 A (THOMPSON) 16 December 1986 see claim 1 see column 4 lines 35-41, column 5 lines 16-25; figs	1 24-26
X	EP 06151 A1 (ETHYL CORPORATION) 06 October 1982 see claim 1, figs 14-16	1

☒ Further documents are listed in the continuation of Box C

☒ See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search
8 July 1996

Date of mailing of the international search report
18 JUL 1996

Name and mailing address of the ISA/AU
AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION
PO BOX 200
WODEN ACT 2606
AUSTRALIA Facsimile No.: (06) 285 3929

Authorized officer

ROGER HOWE

Telephone No.: (06) 283 2159

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 96/00232

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	UK 2041286 A (YOSHINO KOGYOSHO CO. LTD) 10 September 1980 see claim 1, figs 4-7	1
X	WO 82/02369 A1 (THOMSON) 22 July 1982 see pages 2, 3, 6 and 16, figs 5-10	1
X	US 4604044 A (MAFELE) 5 August 1986 see claim 1, figs 6A, and 14-16	1
X	Patent Abstracts of Japan, M1217, page 17, JP 03-268907 A (TOPPAN PRINTING CO LTD) 29 November 1991 see Abstract	1
X	Patent Abstracts of Japan, M81, page 131, JP 56-60225 A (NITSUSEI JIYUSHI KOGYO KK) 25 July 1981 see Abstract	1
X	Modern Plastics Encyclopedia Mid October 1991 Issue, Volume 68, Number 11 (McGraw - Hill) page 226	28

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 96/00232

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1-6 and 18-30 directed to container preform with neck portion having a locating ring with solid stem of thermoplastic to form the handle of the container; and a method of making this parison into a container by blow moulding. It is considered that the locating ring with attached solid stem comprise a first "special technical feature".
(contd)
1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1 and 18-30 as requested by the applicant in a letter dated 24 June 1996

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

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Box II (continued)

2. Claims 7-11 directed to a parison (for an injection stretch blow moulding process) formed by two separate points of injection. It is considered that the "special technical feature" is the two points of injection.
3. Claims 12-17 directed to a container, from a two stage moulding process, including a graspable handle attached at two points such that fingers can pass around it. The graspable handle is considered the "special technical feature".

Since the abovementioned groups of claims do not share the technical features identified, a "technical relationship" between the inventions, as defined in PCT rule 13.2 does not exist. Accordingly the international application does not relate to one invention or to a single inventive concept.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 96/00232

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
GB	2041286	AU	54927/80	CA	1128437	CH	643789
		DE	3001835	FR	2448484	IT	8019774
		NL	8000683				
WO	8202396	NO	822993	SE	430342		

END OF ANNEX